From this it may be seen that without regard to the kind or density of the liquid which is in motion, any particular velocity will correspond to a velocity head, which may be absolutely determined and which will be obtained by the formula

But the pressure necessary to impress motion upon a liquid will be different for each liquid and is proportional to its density.

In considering the movement of gases, the same fundamental principles must be observed:

1. Motion or velocity of flow cannot be initiated or maintained without a corresponding loss of head or pressure, as the loss of head and the velocity impressed have the relationship of a cause and an effect.
2. Any particular velocity of flow corresponds to a velocity head expressed in terms of the gas which is in motion, which may be determined by the formula

3. Equal velocities will be impressed upon gases of different densities by equal velocity heads, but by different pressures. These pressures are proportional to the specific weight of these gases or to the weight of a unit volume.

As the gases appear to act as a form of liquid having the particular property of considerable variation in its specific weight according to changes in its temperature, the third principle is of great importance in all computations relative to the circulation of the flame or hot gases.

The following examples will illustrate this point:

A. In the heating chamber of an open-hearth furnace the hot air emerges from the port with a velocity of 18 m per second at a temperature of 1000°. What is the pressure required to impress this velocity upon the air?

To impress a velocity of 18 m per second upon a fluid will require a velocity head *h—16* m 51.^

In this case it is air at 1000° which is in motion;

the weight of 1 cu m of this gas is

1 ^9

Aiooo = $_{1+}$Vy^ = 0 kg 277.

(1) Refer to Appendix III.